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FORM PTO-1390 US DEPARTMENT OF COMMERCE REV. 5-93 PATENT AND TRADEMARK OFFICE TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		ATTORNEYS DOCKET NUMBER P01,0182
		U.S. APPLICATION NO. (if known, see 37 CFR 1.5) 09/857084
INTERNATIONAL APPLICATION NO. PCT/EP99/09497	INTERNATIONAL FILING DATE 04 DECEMBER 1999	PRIORITY DATE CLAIMED 04 DECEMBER 1998
TITLE OF INVENTION METHOD OF MONITORING FOR AVAILABILITY OF A SYSTEM FUNCTION IN A COMPUTER SYSTEM		
APPLICANT(S) FOR DO/EO/US Jürgen NIESSEN et al.		
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:		
1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. 3. <input type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay. 4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date. 5. <input checked="" type="checkbox"/> A copy of International Application as filed (35 U.S.C. 371(c)(2)). a. <input checked="" type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau). b. <input type="checkbox"/> has been transmitted by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US) 6. <input checked="" type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)). 7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3)). a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau). b. <input type="checkbox"/> have been transmitted by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input checked="" type="checkbox"/> have not been made and will not be made. 8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)). 9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). 10. <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)). Items 11. to 16. below concern other document(s) or information included: 11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98; (PTO 1449, Prior Art, Search Report, one Reference) . 12. <input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included. (SEE ATTACHED ENVELOPE) 13. <input checked="" type="checkbox"/> Amendment "A" Prior to Action and Appendix "A". <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment. 14. <input checked="" type="checkbox"/> A substitute specification and substitute specification mark-up. 15. <input checked="" type="checkbox"/> A change of address letter attached to the Declaration. 16. <input checked="" type="checkbox"/> Other items or information: a. <input checked="" type="checkbox"/> Submission of Drawings, one sheet of drawings, Figs. 1-2 b. <input checked="" type="checkbox"/> Appointment of Associate Power of Attorney c. <input checked="" type="checkbox"/> EXPRESS MAIL #EL 843728265 US dated May 31, 2001		

U.S. APPLICATION NO. (if known) 09/857084		INTERNATIONAL APPLICATION NO PCT/EP99/09497		ATTORNEY'S DOCKET NUMBER P01,0182	
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17. <input checked="" type="checkbox"/> The following fees are submitted: BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5): Search Report has been prepared by the EPO or JPO \$860.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) \$690.00 No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but international search fee paid to USPTO (37 C.F.R. 1.445(a)(2)) \$710.00 Neither international preliminary examination fee (37 C.F.R. 1.482) nor international search fee (37 C.F.R. 1.445(a)(2)) paid to USPTO \$1000.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) \$100.00 <div style="text-align: right;">ENTER APPROPRIATE BASIC FEE AMOUNT =</div>				CALCULATIONS		PTO USE ONLY	
<div style="text-align: right; margin-top: 10px;">ENTER APPROPRIATE BASIC FEE AMOUNT =</div>				\$ 860.00			

Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 C.F.R. 1.492(e))				\$	
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Claims	Number Filed	Number Extra	Rate		
Total Claims	10 - 20 =	0	X \$ 18.00	\$	
Independent Claims	06 - 3 =	3	X \$ 80.00	\$ 240.00	
Multiple Dependent Claims			\$270.00 +	\$	
TOTAL OF ABOVE CALCULATIONS =				\$ 1100.00	
Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 C.F.R. 1.9, 1.27, 1.28)				\$	
SUBTOTAL =				\$ 1100.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +				\$	
TOTAL NATIONAL FEE =				\$ 1100.00	
Fee for recording the enclosed assignment (37 C.F.R. 1.21(h) The assignment must be accompanied by an appropriate cover sheet (37 C.F.R. 3.28, 3.31) \$40.00 per property +					
TOTAL FEES ENCLOSED =				\$ 1100.00	
				Amount to be refunded	\$
				charged	\$

a. ☒ A check in the amount of \$ 1100.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **50-1519**. **A duplicate copy of this sheet is enclosed.**

NOTE: Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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DATE: May 31, 2001

CUSTOMER NUMBER 26574

BOX PCT
IN THE UNITED STATES DESIGNATED/ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY--CHAPTER II

PRELIMINARY AMENDMENT A
PRIOR TO ACTION

APPLICANT(S): Jürgen NIESSEN et al
ATTORNEY DOCKET NO.: P01,0182
INTERNATIONAL APPLICATION NO: PCT/EP99/09497
INTERNATIONAL FILING DATE: 04 DECEMBER 1999
INVENTION: METHOD OF MONITORING FOR AVAILABILITY OF A
SYSTEM FUNCTION IN A COMPUTER SYSTEM

Assistant Commissioner for Patents,
Washington D.C. 20231

Sir:

Applicants herewith amend the above-referenced PCT application, and
request entry of the Amendment prior to examination on the United States
Examination Phase.

IN THE CLAIMS:

On page 6:

replace line 1 with --WHAT IS CLAIMED IS--;

Please replace original claims 1-8 with the following rewritten claims 1-8,
referring to the mark-ups in Appendix A.

1. (Amended) A method of monitoring for availability of a system function in a
computer system, comprising the steps of:

storing, in a database of said computer system, for a system function
monitored for availability, respective information which describes conditions under
which said availability of a system function are to be assessed as existing or no
longer existing; and

utilizing said information, when a change in a state of a component of said
computer system has taken place or is intended to take place, to assess whether
said change that has taken place results, or said change that is intended to take
place would result, in a change in terms of the availability of said system function.

2. (Amended) A method of monitoring for availability of a system function in a computer system, comprising the steps of:

marking, in a database of said system, component mappers for components which contribute to said availability of said system function; and

utilizing said marked component mappers, when a change in a state of a component has taken place or is intended, to assess whether said change in state that has taken place results, or said intended change in state would result, in a change in said availability of said system function.

3. (Amended) A method of monitoring for availability of a system function in a computer system, comprising the steps of:

recording a respective current functional state of a system component for said system component in the database;

recording, by said database, for each system component, whether said component contributes to said availability of a system function monitored for availability, and, if so, for which system function or system functions said component contributes to said availability; and

assessing, when a change in a state of a component of said system has taken place or is intended, using data stored in said database for other system components to assess whether said availability of a system function monitored for availability changes or would change as a result of such a change.

4. (Amended) A method of monitoring for availability of a system function in a computer system, comprising the steps of:

marking, using a stipulation regarding which system function is monitored for availability, among components of said system which are mapped in a database, those components which are necessary for said availability of said system function;

marking, in addition, a respective state of said components of said system which are mapped in the database for said components; and

assessing, when a change in a component state has taken place or is intended, whether said change results or would result in a change in availability of said system function.

5. (Amended) The method as claimed in claim 2, further comprising the step of:

storing, by said database stores, for each system function regarded as being relevant to availability, information which describes conditions under which said availability of a system function is to be assessed as existing or no longer existing.

6. (Amended) An availability monitoring component in a computer system, comprising:

a database; and

system components wherein, when a change in a state of one of said components of said system has taken place or is intended, said system assessing, using information stored in said database, whether said change in state changes or would change an availability of a system function, said database, for this purpose, indicating for each data map for a component whether a mapped component contributes to said availability of a system function, and, if so, to which system function or system functions contribute to said availability of a system function.

7. (Amended) The availability monitoring component as claimed in claim 6, wherein said availability monitoring component additionally makes said assessment based on particular conditions which are stored in said database for each system function regarded as being relevant to availability.

8. (Amended) A computer system, comprising:

a stipulator that stipulates for said system which system function is to be monitored for availability;

a component map which, for a component, records in a database whether said component is at all necessary for a system function monitored for availability and for which system function it is necessary, and which also records for said component its respective functional state; and

an assessor which uses said data recorded in said database made in a component map to assess whether a change in a state of a component which has taken place or is intended to take place has resulted or would result in a change in an availability of said system function.

Please add the following new claims 9 and 10.

9. (New) The method as claimed in claim 3, further comprising the step of:
storing, by said database stores, for each system function regarded as being
5 relevant to availability, information which describes conditions under which said
availability of a system function is to be assessed as existing or no longer existing.

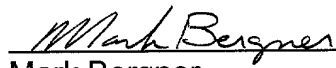
10. (New) The method as claimed in claim 4, further comprising the step of:
storing, by said database stores, for each system function regarded as being
10 relevant to availability, information which describes conditions under which said
availability of a system function is to be assessed as existing or no longer existing.

REMARKS

The present Amendment revises the specification and claims to conform to
United States patent practice, before examination of the present PCT application in
15 the United States National Examination Phase. Pursuant to 37 CFR 1.125 (b),
applicants have concurrently submitted a substitute specification, excluding the
claims, and provided a marked-up copy. All of the changes are editorial and
applicant believes no new matter is added thereby. The amendment, addition,
and/or cancellation of claims is not intended to be a surrender of any of the subject
20 matter of those claims.

Early examination on the merits is respectfully requested.

Submitted by,

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Appendix A
Mark Ups for Claim Amendments

1. **(Amended)** A method of monitoring for availability of a system function in
a computer system, ~~[according to which]~~ **comprising the steps of:**

~~[—]storing, in~~ a database of ~~[the]~~ **said** computer system ~~[—stores]~~, for a system
function monitored for availability, respective information which describes ~~[the]~~
~~]conditions under which [the]~~ **said** availability of a system function ~~[is]~~ **are** to be
assessed as existing or no longer existing~~;~~ **and**

~~[— the]~~ **utilizing** ~~[aforementioned]~~ **said** information ~~[—is used]~~, when a
change in ~~[the]~~ **a** state of a component of ~~[the]~~ **said** computer system has taken place
or is intended **to take place**, to assess whether ~~[this]~~ **said change that has taken**
place results, or **said change that is intended to take place** would result, in a
change in terms of the availability of ~~[the aforementioned]~~ **said** system function.

2. **(Amended)** A method of monitoring for availability of a system function in
a computer system, ~~[according to which]~~ **comprising the steps of:**

~~[— a system function for monitoring for availability is prescribed by~~
~~]marking, in a database of [the]~~ **said** system ~~[—the]~~, component mappers for ~~[the]~~
components which contribute to ~~[the]~~ **said** availability of ~~[the aforementioned]~~ **said**
system function~~;~~ **and**

~~[— the component mappers]~~ **utilizing said** marked ~~[as such are~~
used~~]component mappers~~, when a change in ~~[the]~~ **a** state of a component has
taken place or is intended, to assess whether ~~[this]~~ **said change in state that has**
taken place results, or **said intended change in state** would result, in a change in
~~[the]~~ **said** availability of ~~[the aforementioned]~~ **said** system function.

3. **(Amended)** A method of monitoring for availability of a system function in
a computer system, ~~[according to which]~~ ~~[—]~~ **comprising the steps of:**

recording a respective current ~~[functional]~~ state of a ~~[system]~~
component ~~[—is recorded]~~ for said ~~[system]~~ component in the database~~;~~

~~[— in addition, the]~~ **recording, by said** database ~~[—records]~~, for each
system component, whether said component contributes to ~~[the]~~ **said** availability of a
system function monitored for availability, and, if so, for which system function or
system functions~~;~~ **said component contributes to said availability; and**

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5 ~~[-]~~assessing, when a change in ~~[the]~~a state of a component of ~~[the]~~said system has taken place or is intended, ~~[the]~~using data stored in ~~[the]~~said database for~~[the]~~ other system components ~~[are used]~~to assess whether ~~[the]~~said availability of a system function monitored for availability changes or would change as a result of ~~[the]~~such ~~[aforementioned]~~a change.

4. **(Amended)** A method of monitoring for availability of a system function in a computer system, ~~[according to which]~~**comprising the steps of:**

10 ~~[-]~~**marking, using** a stipulation regarding which system function is monitored for availability~~[is used to mark]~~, among ~~[the]~~components of ~~[the]~~said system which are mapped in ~~[the]~~a database, those components which are necessary for ~~[the]~~said availability of ~~[the]~~said system function~~[;]~~;

15 ~~[-]~~**marking**, in addition, ~~[the]~~a respective state of ~~[the]~~said components of ~~[the]~~said system which are mapped in the database ~~[is marked]~~for said components~~[;]~~ **and**

20 ~~[-]~~**assessing**, when a change in ~~[the state of]~~a component **state** has taken place or is intended, ~~[an assessment is made of]~~whether ~~[this]~~**said change** results or would result in a change in ~~[the]~~availability of ~~[the aforementioned]~~said system function.

25 5. **(Amended)** The method as claimed in ~~[one of claims 2 to 4,]~~**claim 2,**
further comprising the step of:

~~[characterized in that]~~

30 ~~[the]~~**storing, by said** database stores, for each system function regarded as being relevant to availability, information which describes ~~[the]~~conditions under which ~~[the]~~said availability of a system function is to be assessed as existing or no longer existing.

6. **(Amended)** An availability monitoring component in a computer system, ~~[which]~~**comprising:**

a database; and

35 **system components wherein**, when a change in ~~[the]~~a state of ~~[a component]~~**one of [the]said components of said** system has taken place or is intended, ~~[uses]~~**said system assessing, using** information stored in ~~[the]~~said database~~[to assess]~~, whether ~~[this]~~**said change in state** changes or would change ~~[the]~~**an** availability of a system function, ~~[where]~~**said database**, for this purpose, ~~[the database indicates]~~**indicating** for each data map for a component whether ~~[the]~~a

mapped component contributes to ~~the~~said availability of a system function, and, if so, to which system function or system functions contribute to said availability of a system function.

5 7. **(Amended)** The availability monitoring component as claimed in claim 6, ~~characterized in that~~ wherein said availability monitoring component additionally makes ~~the aforementioned~~said assessment based on ~~the basis of~~ particular conditions which are stored in ~~the~~said database for each system function regarded as being relevant to availability.

10 8. **(Amended)** A computer system, ~~having~~comprising:
[—]a ~~stipulation means which can stipulate~~stipulator that stipulates for ~~the~~said system which system function is to be monitored for availability~~;~~;
[—]a component map which, for a component, records in ~~the~~a database whether said component is at all necessary for a system function monitored for availability and for which system function it is necessary, and which also records for ~~the~~said component ~~the~~its respective ~~(functional)~~ state~~;~~ ~~thereof,~~and
15 [—]an ~~assessment means~~assessor which uses ~~the aforementioned records~~said data recorded in said database made in a component map to assess whether a change in ~~the~~a state of a component which has taken place or is intended to take place has resulted or would result in a change in ~~the~~an availability
20 of ~~the aforementioned~~said system function.

SPECIFICATION

TITLE

METHOD OF MONITORING FOR AVAILABILITY OF A SYSTEM FUNCTION IN A
COMPUTER SYSTEM

5

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The invention relates to a method and respective component and system for monitoring the availability of a system function when a change in the state of a component of the system has taken place or is intended.

10

Description of the Related Art

[0002] Previously, digital switching systems (e.g., the systems EWSD and EWSX from Siemens AG) contained no function which monitored particular functionalities distributed over a large number of hardware (HW) units (platforms). This created the following technical problems:

15

[0003] - If HW units were no longer active on account of errors (hardware HW or software SW), the operator himself had to deduce which functionalities of the system had been lost.

20

[0004] - Routine tests on HW units meant that there was the possibility that particular functionalities were no longer available, since HW units were automatically disconnected during routine tests.

[0005] - An operator was able to deactivate HW units without receiving any indication of which functionalities of the system would be lost as a result of the deactivation.

25

[0006] Of the problems indicated above, only the first has been partially solved:

[0007] - Detection of whether a particular functionality is not available in the system was provided exclusively during the startup phase (in EWSD: adjudgement of #7 total failure).

[0008] - Upon adjudgement of #7 total failure, initiation of a recovery escalation.

Drawbacks of this solution:

[0009] During normal operation, there is, to date, no direct adjudgement of or
5 monitoring for loss of an important system function.

[0010] There is also no predictive assessment of whether a fundamental system function will be lost on account of an HW configuration.

SUMMARY OF THE INVENTION

[0011] The invention is based on the object of overcoming the
10 aforementioned drawbacks.

[0012] This object is achieved by a method of monitoring for availability of a system function in a computer system, comprising the steps of storing, in a database of said computer system, for a system function monitored for availability, respective information which describes conditions under which said availability of
15 a system function are to be assessed as existing or no longer existing; and utilizing said information, when a change in a state of a component of said computer system has taken place or is intended to take place, to assess whether said change that has taken place results, or said change that is intended to take place would result, in a change in terms of the availability of said system function.

[0013] According to the invention, an arbitrary system functionality indicated
20 by the network operator is mapped in the database using the data types and the loading types of the HW units. The mapped data are provided with a functional state, are maintained and are assessed on the basis of the system state (including predictively).

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The invention is explained in more detail below with reference to the drawings.

[0015] Figure 1 is a block diagram showing a general association between data types and HW units; and

[0016] Figure 2 is a data structure diagram illustrating data types that may be available on various HW units MP-Dep.

DETAILED DESCRIPTION OF THE INVENTION

[0017] Figure 1 illustrates the entire system having a functionalities in subsystem 1 (with data types A and B) and subsystem 2 (with data types C and D). Platform x is shown having both data types A and B, and platforms y and z having only data type A and B respectively.

[0018] The following (operator-related) data types exist on the systems EWSD and EWSX:

- [0019] - CALLP (Data for call processing operations)
- [0020] - CM (Data for call processing operations)
- [0021] - SLT (Data for #7 signaling and other signaling types)
- [0022] - SM (Data for #7 signaling)
- [0023] - PNNI (Data for private networks)
- [0024] - MN (Data for mobile radio)
- [0025] - PD (Data for mobile radio)
- [0026] - LIC (Data for a line termination)

[0027] Examples are illustrated in Figure 2.

[0028] In addition to the data types mentioned, the loading type of an HW unit determines whether or not this HW unit is relevant in the context of total failure. Thus, by way of example, the data type SLT is used on the basis of its loading type, i.e., all MP-Deps having the data type SLT hold the same data. The loading type is used to decide which processes ultimately access these data and process them.

[0029] The combination of data type and loading type stipulates what functionality is provided by a particular HW unit. Thus, an MP-Dep having the data type SLT may or may not be relevant to #7 signaling, depending on the loading type. To illustrate more simplistically, the designation #7-SLT is used below when the loading type of the MP-Dep means that it is relevant to #7 signaling. Otherwise, just the designation SLT is used.

[0030] If, by way of example, the system functions "call processing" and "#7 signaling" have now been assessed as being relevant in the context of total failure, the check on the availability of the call processing functionality needs to be assured of the availability of at least one MP-Dep from the set [MP-Dep 1x and MP-Dep 2x] in the example in Figure 2. For the #7 functionality, the MP-Deps 1x, 2x and the MP-Dep 40 need to be checked.

[0031] Since the network operator would usually wish to define the instant at which system functions are to be assessed as relevant to failure, the aforementioned check must be of flexible design. This is achieved as follows:

[0032] - The components (HW units) of the system are mapped in the database,

[0033] - for a mapped component, a respective record is made of whether, on the basis of its data and loading type, this component is necessary for one or more system functions which are relevant in the context of failure (the details required for making the aforementioned record can be prescribed by a network operator, for example),

[0034] - for a component mapped in this way, an additional record is made of the instant (e.g., during startup, after startup, or at any time) at which this component is necessary (the details required for making the aforementioned record can likewise be prescribed by a network operator),

[0035] - for each system function, the minimum number of the mapped components which are needed to maintain this very system function is also stipulated,

[0036] - for a mapped component, its respective (functional) state is also recorded, i.e., whether or not it is active,

[0037] - this state (active/not active) is maintained by the maintenance SW already existing for this purpose,

[0038] - any change in a state is reported to a total failure detection unit,

[0039] - in this context, this report may be sent before or after a change in a state,

[0040] - if this report is sent before the change in a state (e.g., if an operator wants to deactivate components, e.g., HW units, or if a routine test is to be carried out), the total failure detection unit assesses whether deactivating a particular component would result in a particular system function being lost, and
5 notifies the report originator (e.g., maintenance SW, etc.) of this fact,

[0041] - if this message is sent after the change in a state (e.g., when a component fails), the total failure detection unit assesses whether deactivation of a unit has caused a particular system function to be lost. The result of this assessment is forwarded to the report originator (e.g., protective SW),

10 [0042] - the report originator can now react in the manner which it deems appropriate (alarm, rejection of the operator order, rejection of the routine test (which would result in the unit being disconnected), repetition of startup, etc.).

[0043] The above-described method and component are illustrative of the principles of the present invention. Numerous modifications and adaptations will be
15 readily apparent to those skilled in this art without departing from the spirit and scope of the present invention.

Figure 1 consists of 12 line graphs arranged in a 3x4 grid. The columns represent four groups of rats: (a) control, (b) diazepam, (c) diazepam + diazepam, and (d) diazepam + diazepam + diazepam. The rows represent three different time points: 0.5 h, 1 h, and 2 h after administration. Each graph plots the plasma concentration of diazepam (mg/kg) on the y-axis (ranging from 0 to 10) against time (h) on the x-axis (ranging from 0 to 2). The graphs show that the plasma concentration of diazepam increases over time in all groups, with the highest concentration observed in the diazepam + diazepam + diazepam group.

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JC18 Rec'd PCT/PTO 31 MAY 2001

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Description

Method of monitoring for availability of a system function in a computer system

5

To date, digital switching systems (e.g. the systems EWSD and EWSX from Siemens AG) contained no function which monitored particular functionalities distributed over a large number of HW units (platforms). This created the following technical problems:

10

- If HW units were no longer active on account of errors (HW or SW), the operator himself had to deduce which functionalities of the system had been lost.

15

- Routine tests on HW units meant that there was the possibility that particular functionalities were no longer available, since HW units were automatically disconnected during routine tests.

20

- An operator was able to deactivate HW units without receiving any indication of which functionalities of the system would be lost as a result of the deactivation.

25

Of the problems indicated above, only the first has been partially solved:

- Detection of whether a particular functionality is not available in the system was provided exclusively during the startup phase (in EWSD: adjudgement of #7 total failure).

30

- Upon adjudgement of #7 total failure, a recovery escalation is initiated.

Drawbacks of this solution:

• During normal operation, there is to date no direct adjudgement of or monitoring for loss of an important system function.

35

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- There is also no predictive assessment of whether a fundamental system function will be lost on account of an HW configuration.

5 The invention is based on the object of overcoming the aforementioned drawbacks.

This object is achieved by a method in accordance with claim 1.

10 According to the invention, an arbitrary system functionality indicated by the network operator is mapped in the database using the data types and the loading types of the HW units. The mapped data are provided with a functional state, are maintained and are assessed on the basis of the system state (including predictively).

15 The invention is explained in more detail below with reference to the drawing, the drawing comprising two figures.

FIGURE 1 shows a general association between data types and HW units.

20 The following (operator-related) data types exist on the systems EWSD and EWSX:

- CALLP (Data for call processing operations)
- CM (Data for call processing operations)
- 25 - SLT (Data for #7 signaling and other signaling types)
- SM (Data for #7 signaling)
- PNNI (Data for private networks)
- MN (Data for mobile radio)
- 30 - PD (Data for mobile radio)
- LIC (Data for a line termination)

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The data types listed above may be available on various HW units MP-Dep, for example, as shown in FIGURE 2.

5 In addition to the data types mentioned, the
loading type of an HW unit determines whether or not
said HW unit is relevant in the context of total
failure. Thus, by way of example, the data type SLT is
used on the basis of its loading type. That is to say
all MP-Deps having the data type SLT hold the same
10 data. The loading type is used to decide which
processes ultimately access these data and process
them.

15 The combination of data type and loading type
stipulates what functionality is provided by a
particular HW unit. Thus, an MP-Dep having the data
type SLT may or may not be relevant to #7 signaling,
depending on the loading type. For the purposes of
simpler illustration, the designation #7-SLT is used
below when the loading type of the MP-Dep means that it
20 is relevant to #7 signaling. Otherwise, just the
designation SLT is used.

25 If, by way of example, the system functions
"call processing" and "#7 signaling" have now been
assessed as being relevant in the context of total
failure, the check on the availability of the call
processing functionality needs to be assured of the
availability of at least one MP-Dep from the set [MP-
Dep 1x and MP-Dep 2x] in the example in FIGURE 2. For
the #7 functionality, the MP-Deps 1x, 2x and the MP-Dep
30 40 need to be checked.

Since the network operator would usually wish
to define the instant at which system functions are to
be assessed as relevant to failure, the aforementioned
check must be of flexible design. This is achieved as
35 follows:

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- The components (HW units) of the system are mapped in the database,
 - for a mapped component, a respective record is made of whether, on the basis of its data and loading type, said component is necessary for one or more system functions which are relevant in the context of failure (the details required for making the aforementioned record can be prescribed by a network operator, for example),
 - 10 - for a component mapped in this way, an additional record is made of the instant (e.g. during startup, after startup or at any time) at which said component is necessary (the details required for making the aforementioned record can likewise be prescribed by a network operator),
 - 15 - for each system function, the minimum number of the mapped components which is needed to maintain this very system function is also stipulated,
 - for a mapped component, its respective (functional) state is also recorded, i.e. whether or not it is active,
 - 20 - this state (active/not active) is maintained by the maintenance SW already existing for this purpose,
 - any change in a state is reported to the total failure detection unit,
 - 25 - in this context, this report may be sent before or after a change in a state,
 - if this report is sent before the change in a state (e.g. if an operator wants to deactivate components, e.g. HW units, or if a routine test is to be carried out), the total failure detection unit assesses whether deactivating a particular component would result in a particular system function being lost, and notifies the report originator (e.g. maintenance SW, etc.) of this fact,
 - 30 - if this message is sent after the change in a state (e.g. when a component fails), the total failure detection unit assesses whether deactivation of a
 - 35

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unit

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has caused a particular system function to be lost.
The result of this assessment is forwarded to the
report originator (e.g. protective SW),

- the report originator can now react in the manner
5 which it deems appropriate (alarm, rejection of the
operator order, rejection of the routine test (which
would result in the unit being disconnected),
repetition of startup, etc.).

10 Abbreviations used:

HW: Hardware

MP-Dep: HW unit

SW: Software

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Patent Claims

1. A method of monitoring for availability of a system function in a computer system, according to which
- a database of the computer system stores, for a system function monitored for availability, respective information which describes the conditions under which the availability of a system function is to be assessed as existing or no longer existing,
 - the aforementioned information is used, when a change in the state of a component of the computer system has taken place or is intended, to assess whether this results or would result in a change in terms of the availability of the aforementioned system function.
2. A method of monitoring for availability of a system function in a computer system, according to which
- a system function for monitoring for availability is prescribed by marking in a database of the system the component mappers for the components which contribute to the availability of the aforementioned system function,
 - the component mappers marked as such are used, when a change in the state of a component has taken place or is intended, to assess whether this results or would result in a change in the availability of the aforementioned system function.
3. A method of monitoring for availability of a system function in a computer system, according to which
- the respective current (functional) state of a (system) component is recorded for said (system) component in the database,

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- 5 - in addition, the database records, for each system component, whether said component contributes to the availability of a system function monitored for availability, and, if so, for which system function or system functions,

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- 5 - when a change in the state of a component of the system has taken place or is intended, the data stored in the database for the other system components are used to assess whether the availability of a system function monitored for availability changes or would change as a result of the aforementioned change.
- 10 4. A method of monitoring for availability of a system function in a computer system, according to which
- 15 - a stipulation regarding which system function is monitored for availability is used to mark, among the components of the system which are mapped in the database, those components which are necessary for the availability of the system function,
- 20 - in addition, the respective state of the components of the system which are mapped in the database is marked for said components,
- when a change in the state of a component has taken place or is intended, an assessment is made of whether this results or would result in a change in the availability of the aforementioned system function.
- 25 5. The method as claimed in one of claims 2 to 4, characterized in that
- 30 the database stores, for each system function regarded as being relevant to availability, information which describes the conditions under which the availability of a system function is to be assessed as existing or no longer existing.

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6. An availability monitoring component in a computer system, which, when a change in the state of a component of the system has taken place or is intended, uses information stored in the database to assess whether this changes or would change the availability of a system function, where, for this purpose, the database indicates for each data map for a component whether the mapped component contributes to the availability of a system function, and, if so, to which system function or system functions.

7. The availability monitoring component as claimed in claim 6, characterized in that the availability monitoring component additionally makes the aforementioned assessment on the basis of particular conditions which are stored in the database for each system function regarded as being relevant to availability.

8. A computer system, having

- a stipulation means which can stipulate for the system which system function is to be monitored for availability,
- a component map which, for a component, records in the database whether said component is at all necessary for a system function monitored for availability and for which system function it is necessary, and which also records for the component the respective (functional) state thereof,
- an assessment means which uses the aforementioned records made in a component map to assess whether a change in the state of a component which has taken place or is intended has resulted or would result in a change in the availability of the aforementioned system function.

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TOTAL 1872580

Abstract

Method of monitoring for availability of a system function in a computer system

To date, digital switching systems contained no function which monitored particular system functions distributed over a large number of different HW units. According to the invention, any desired system function indicated by the network operator is now mapped in the database using the data types and the loading types of the HW units. The mapped data are provided with a functional state, are maintained and are assessed on the basis of the system state (including predictively).

Figure 1

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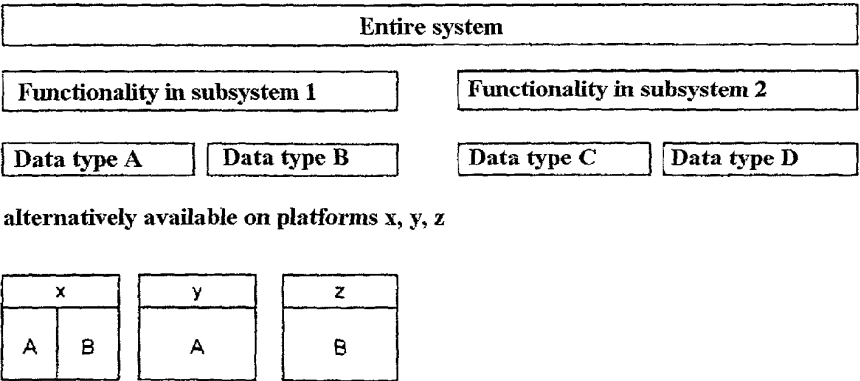


FIG 1

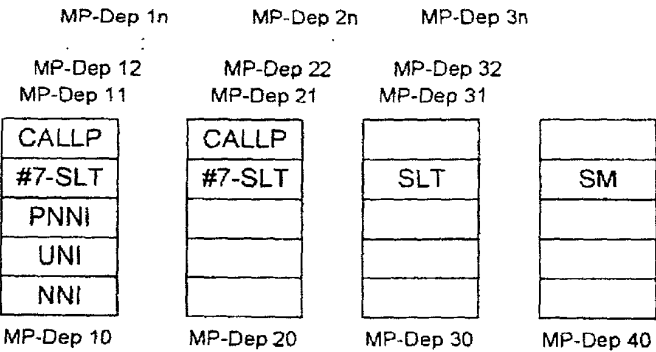


FIG 2

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**BOX PCT
IN THE UNITED STATES DESIGNATED/ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY-CHAPTER II**

CHANGE OF ADDRESS OF APPLICANTS' REPRESENTATIVE

APPLICANT(S): Jürgen NIESSEN et al
ATTORNEY DOCKET NO.: P01,0182
INTERNATIONAL APPLICATION NO: PCT/EP99/09497
INTERNATIONAL FILING DATE: 04 DECEMBER 1999
INVENTION: METHOD OF MONITORING FOR AVAILABILITY OF A SYSTEM FUNCTION IN A
COMPUTER SYSTEM

Assistant Commissioner for Patents,
Washington D.C. 20231

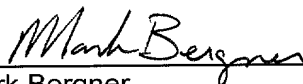
S I R:

Members of the firm of Hill & Simpson designated on the original Power of Attorney have merged into the firm of Schiff Hardin & Waite. All future correspondence for the above-referenced application therefore should be sent to the following address:

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09/857084-130/5860

German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: (Name und Registrationsnummer anführen)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

And I hereby appoint

Messrs. John D. Simpson (Registration No. 19,842), Lewis T. Steadman (17,074), William C. Stueber (16,453), P. Phillips Connor (19,259), Dennis A. Gross (24,410), Marvin Moody (16,549), Steven H. Noll (28,982), Brett A. Valiquet (27,841), Thomas I. Ross (29,275), Kevin W. Guynn (29,927), Edward A. Lehmann (22,312), James D. Hobart (24,149), Robert M. Barrett (30,142), James Van Santen (16,584), J. Arthur Gross (13,615), Richard J. Schwarz (13,472) and Melvin A. Robinson (31,870), David R. Metzger (32,919), John R. Garrett (27,888) all members of the firm of Hill, Steadman & Simpson, A Professional Corporation.

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(Supply similar information and signature for third and subsequent joint inventors).

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09504-03860

Voller Name des dritten Miterfinders: NIEDERAU, Bernd		Full name of third joint inventor:	
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Unterschrift des Erfinders <i>Klaus W</i>	Datum 3.12.93	Inventor's signature	Date
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Staatsangehörigkeit		Citizenship	
Postanschrift		Post Office Address	
Voller Name des sechsten Miterfinders (falls zutreffend):		Full name of sixth joint inventor, if any:	
Unterschrift des Erfinders	Datum	Inventor's signature	Date
Wohnsitz		Residence	
Staatsangehörigkeit		Citizenship	
Postanschrift		Post Office Address	

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).

German Language Declaration

Prior foreign applications
Priorität beansprucht

Priority Claimed

981 23 177.2 Germany (EPO) 04. Dezember 1998

(Number) (Country) (Day Month Year Filed)
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☒ ☐
Yes No
Ja Nein

(Number) (Country) (Day Month Year Filed)
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☐ ☐
Yes No
Ja Nein

(Number) (Country) (Day Month Year Filed)
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☐ ☐
Yes No
Ja Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date)
(Anmeldedatum)

(Status)
(patentiert, anhängig,
aufgegeben)

(Status)
(patented, pending,
abandoned)

(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date)
(Anmeldedatum)

(Status)
(patentiert, anhängig,
aufgeben)

(Status)
(patented, pending,
abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden koennen, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Declaration and Power of Attorney For Patent Application

Erklärung Für Patentanmeldungen Mit Vollmacht

German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

Verfahren zur Überwachung auf Verfügbarkeit einer Systemfunktion in einem Rechner-System

deren Beschreibung

(zutreffendes ankreuzen)

☒ hier beigefügt ist.

☐ am _____ als

PCT internationale Anmeldung

PCT Anwendungsnummer _____

Eingereicht wurde und am _____

Abgeändert wurde (falls tatsächlich abgeändert).

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

the specification of which

(check one)

☐ is attached hereto.

☐ was filed on _____ as

PCT international application

PCT Application No. _____

and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

PTO-FB-240 (8-83)